(a)	**(i)**	**State the relationship between the price of crude oil and the price of recycled plastics shown in Figure 1 and Figure 2.**	**[1]**
		● Positive or direct relationship	
	(ii)	**With reference to Extract 1, explain how a fall in the price of crude oil might impact the price of recycled plastics.**	**[3]**
		● Oil is a key input in the manufacture of new plastics, so when the price of oil falls, the cost of production of new plastics falls. This raises the supply and lowers the price of new plastics (1m). ● From Extract 1, as recycled plastic is a substitute for new plastic, when the price of new plastic falls, producers of goods using plastics will switch from the buying recycled plastics to new plastics (1m) ● This causes the demand and hence the prices for recycled plastic to fall (1m)	
(b)	**Explain what Waste Management CEO David Steiner meant when he said in Extract 1, "when prices are high we'll pay you to recycle. When prices are low we have to charge you."**		**[2]**
	● TR = revenue earned from selling recycled materials ● TC = cost of buying recyclable waste + cost of processing such waste ● High prices of recycled materials => TR exceeds the cost processing recyclable waste => waste management firms are willing to pay for recyclable waste. (1m) ● Low price of recycled materials => TR falls below processing costs => waste management firms need to charge for the collection of for recyclable waste to avoid making losses. (1m)		
(c)	**Use the concept of opportunity cost to explain <u>two</u> reasons why many countries have increasingly turned to recycling instead of disposing their waste in landfills mentioned in extract 2.**		**[4]**
	● "Precious land" in Extract 3 suggests that land is limited so when a piece of land is used as a landfill, there is a high opportunity cost in terms of the next best alternative forgone, which could some residential, industrial or commercial development. As recycling of waste reduces the need for landfills, this frees up land for such alternative uses. (2m) ● Recycling also "replaces new materials in the manufacturing process" thus reducing the demand, extraction and hence depletion of such non-renewable natural resources, which also has high opportunity costs in in terms of other goods that could have otherwise been produced. (2m) Other possible answer: ● Recycling reduces environmental damage caused by landfills. As such, this free up government spending that was originally spent on reducing pollution to be used for next best alternative such as spending on healthcare.		
(d)	**Explain why waste collection paid through a flat fee results in residents who "recycle and prevent waste subsidizing their neighbors' wastefulness".**		**[2]**

	● With a fixed fee charged for all households, those who generate more waste could be paying less than the cost of disposing their waste while those who generate less waste could be paying more than the cost incurred from disposing their waste (1m) ● As residents who recycle and prevent waste are likely to generate less waste while those who do not are likely to generate more waste, the profits earned by the recycling firm from the former are therefore used to subsidize the losses incurred from providing waste disposal services to the latter (1m)	
(e)	**Assess the extent to which the promotion of recycling can help to achieve sustained and sustainable growth in the US.**	**[8]**
	● Sustained growth refers to a positive and stable rate of growth that can be maintained over a prolonged period. ● Sustainable growth refers to growth which is achieved without significantly creating other economic problems like the depletion of resources and environmental degradation that will reduce the welfare of future generations. <u>Thesis: Recycling promotes sustained and sustainable growth in the US</u> Sustained growth ● Recycling sector generates investments and jobs in the recycling and remanufacturing sectors like the designing of long lasting and more repairable goods (extract 2) ● Such investments in the recycling sector raises AS and also through the multiplier effect raise overall consumption, AD, output and growth throughout the economy, hence promoting sustained growth Sustainable growth ● Recycling reduces the need for landfills, thus preventing environmental degradation through possible contamination of water sources through seepage (extract 2) ● Recycling also reduces environmental degradation through air pollution because it prevents toxic chemicals and greenhouse gases from being released into the atmosphere due to the incineration of waste (extract 2). ● Recycling reduces the depletion of natural resources as it lowers the demand and extraction of energy and raw materials like fossil fuels and trees/forests that are often non-renewable in nature (extract 2) <u>Anti-thesis: Recycling harms sustained and/or sustainable growth in the US</u> Sustained growth ● Promoting recycling will result in reduced demand, output and employment for firms and workers belonging to the sectors involved in the extracting and processing of new natural resources Sustainable growth ● Resource depletion - the recycling process still consumes energy (and other resources) as separate manufacturing plants need to be built and used (extract 3) ● Environmental degradation - recycling sites are polluting as they have “heaps of trash that are grounds for bacteria, disease, and a laundry list of other unsafe conditions” and they are also industrial plants that generate their own forms of pollution (extract 3)	

Conclusion / Evaluation

- In terms of sustained growth, if the estimates of the generation of $1 billion in revenue and hundreds of thousands of jobs as mentioned in extract 2 are accurate, the impact on sustained growth is likely to be substantial
- As for sustainable growth, given that resource depletion and environmental degradation can be prevented when goods are reused rather merely being reduced when they are recycled, the impact of recycling is arguably much more limited in comparison.

Mark Scheme

L2: (4-6)	● Provides a balanced response (i.e. both thesis and anti-thesis) ● Covers sufficient scope i.e. considers the impact on both sustained and sustainable growth ● Applies case evidence to support answers ● Applies economic concepts or theories ● Demonstrates sufficient depth and rigour in the analysis
L1: (1-3)	● Lacking in any of the L2 criterions
E (+2)	● Evaluates the extent to which recycling promotes sustained or sustainable growth in the US

(f) Discuss whether it would be more effective for the government to subsidize recycling or implement PAYT to address waste pollution. **[10]**

How does subsidizing recycling work and what are its limitations?

- Waste pollution occurs because of air pollution arising incinerated waste and water pollution arising from landfills
- With more waste being recycled, less waste is incinerated and diverted to landfills hence recycling generates positive externalities as it reduces pollution associated with such activities
- Recycling thus benefits 3rd parties like the people staying near incineration plants and landfills as they will experience less pollution.
- In the market for recycling, positive externalities => SMB > PMB by EMB resulting in underproduction, so subsidizing recycling thus lowers PMC to PMC' such that the private equilibrium coincides with the social equilibrium (illustrate with diagram)
- Limitations:
  - When prices of recycled materials fall, recycling becomes less profitable and waste management firms may decide to collect or process less recyclable waste (extract 1), resulting in more waste being incinerated or diverted to landfills
  - Although subsidies will reduce the likelihood and extent, it does not prevent this from happening, so overall waste incineration and dumping may still increase despite such subsidies.

How does PAYT work and what are its limitations?

- Whether waste is incinerated, dumped or recycled, pollution and resource depletion will occur so waste generates negative externalities
- With a flat fee being charged for waste collection and disposal, the marginal cost of disposing an additional unit of waste would be zero, thus firms and households have no incentive to generate less waste, hence resulting excessive waste generation
- By implementing PAYT, firms and households are charged based on the amount of waste thrown, which creates an incentive for them generate less waste

- Less waste can be generated by not only recycling more, but also reusing rather than disposing existing goods, buying goods which generate less waste (e.g. less packaging) or by switching to less wasteful production methods and lifestyles
- Limitations:
  - Even with PAYT, the cost of waste disposal may still constitute a small proportion of income for the average household, especially for a rich developed country like the USA, so the incentive for households to cut down on waste generation may be less than expected

<u>Conclusion:</u>

- Although both policies have their limitations, PAYT is likely to be overall more effective because it will always provide some incentive for firms and households to cut waste, which can occur through a variety of ways in addition to recycling.
- In contrast, subsidies only promote recycling and has no impact on other ways of reducing waste, so it can be totally ineffective when prices of recycled materials were to fall drastically

Mark Scheme

L2: (5-7)	● Provides a balanced response that considers how subsidies and PAYT address waste pollution. ● Limitations of policies are well considered. ● Analyses with depth and rigour ● Supports answers with case evidence ● Applies economic concept and theories
L1: (1-4)	● Lacking in any one of the L2 criterions
E: (+3)	● Evaluates which of the two policies is more effective and likely to be preferred solution to address waste pollution.